

SEQUENCE LISTING

<110> University of Guelph

<120> Novel Inducible Genes From Alfalfa And Method Of Use Thereof

<130> 08-892370WO

<140> PCT/CA03/00964

<141> 2003-06-27

<150> 60/392,444

<151> 2002-06-28

<160> 19

<170> PatentIn version 3.1

<210> 1

<211> 474

<212> DNA

<213> Medicago sativa

<220>

<223> Nucleotide sequence of H7 coding region

<400> 1

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aaggctcttg caaaagatgc tgatgaaatc gtcccaaagg tgatttctgc tgcccaaagt      120
gttgaaattg ttgaaggaaa tggaggaccc ggaactatta agaagctatc cattgttgaa      180
gatggcaaaa ccaactttgt gctacacaaa ttagattcag tggatgaggc aaactttgga      240
tataactaca gcttagtggg aggaacaggg ttggatgaaa gtttagagaa agttgaattt      300
gagacaaaaa ttgttgctgg ctctgatggt ggatccattg ttaagatttc agtgaaatac      360
cataccaaag gtgatgcaac tctatctgaa gcagtacgtg aggagactaa ggccaaagga      420
actggactta tcaaggccat tgagggtac gttttagcaa accctaatta ctag              474
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<210> 2

<211> 678

<212> DNA

<213> Medicago sativa

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<223> Nucleotide sequence of H11 coding region

<400> 2

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| tcaacctcaa aacatgttgt tccacttcca tccaaattca atattgtccc tcccacccca | 120 |
| ctaaagtttt cattagatca tcaaattaat atcaaacaaa cttctcttct atccctcaca | 180 |
| gcaatcacat ttccattctt attggatacc aaagagtttg ggatatttga aggaagaaca | 240 |
| tttgcctca ttcaccccat tgtgttgggt ggtttgttct tctatactct atatgctggc | 300 |
| tatttggggt ggcaatggcg ccgagttagg actattcaaa atgatattaa tgagctcaag | 360 |
| aaacaactca aacctgcacc ggtcgccct gatggtaaag cacttgaaac ttcaccgcca | 420 |
| tcacctgttg aacttcaa at ccagaaactt actgaggaga ggaaagagct tatcaaaggt | 480 |
| tcatacaggg ataaacactt taatgctgga tccatacttc taggatttgg tgtctttgag | 540 |
| gctgttggtg tgaggactca acacatgggt aaggacagga aagctatttc caggtccaca | 600 |
| tttatttgca ggagcaggca ttaccgtctt atgggcactg gcagcagctc tagtaccacc | 660 |
| gatgcagaaa ggcagtga | 678 |

<210> 3
 <211> 744
 <212> DNA
 <213> Medicago sativa

<220>
 <223> Nucleotide sequence of H12 coding region

| | |
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| <400> 3 | |
| atggcaacca acgaagatca aaagcaaact gaatctggaa gacatcaaga agttggtcac | 60 |
| aagagtcttt tacaaagtga tgctctttac cagtatatc tagagaccag tgtcttccca | 120 |
| agagaacatg aagccatgaa agagttgaga gaggtcacag caaacacccc atggaacatc | 180 |
| atgacaacct ctgcagatga aggacaattt ttgagcatgc tctttaaact tatcaatgct | 240 |
| aagaatacca tggaaattgg tgtctacact ggctactccc tcttgccac tgccctagct | 300 |
| attcctgaag atggaaagat tttggctatg gacattaaca aagaaaatta cgaattgggt | 360 |
| ctacctgtaa ttaaaaaagc tgggtttgat cacaaaattg atttcagaga aggtccagct | 420 |
| cttcagttc ttgatgaaat gatcaaagac gaaaagaatc atggtagcta cgatttcatt | 480 |
| tttgtggatg ctgacaaaga caattacctc aactaccata agaggttaat tgatcttggt | 540 |
| aaagtgggag gtgtgatcgg gtacgacaac accttatgga atggatctgt ggttgacccc | 600 |
| cctgatgctc cattgaggaa gtatgttagg tactatagag attttgtttt ggagcttaac | 660 |
| aaggcttttg ctgtggacce taggattgaa atatgtatgc ttcctgttgg tgatggaatc | 720 |

actatctgcc gtaggatcaa gtaa

744

<210> 4

<211> 634

<212> DNA

<213> Medicago sativa

<220>

<223> Nucleotide sequence of H7 regulatory region

<400> 4

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acgcgtggtc gacggcccgg gctggtacta aagtattact attaccaaatt ttttaggacc      60
ccacccatga caccattgct atatttcaat ttgggaaaat attgctataa agttactgta      120
gtaactttta gaagaagggt ttttttttaa ggattttaga ggaagggttag caacacacat      180
gcactttaaa tatacathtt ttcttataaa gtttttgtat cgagttgaga aatcatatat      240
atactcataa atcatgtgga tttcatataa tttaatagaa cacataaatt ttaaccgaga      300
aataaagtgt tgcaaataata tggtaaaaga gtacgttggt aacattatht taatttcttt      360
tattcaatcc acactttgag tcatggactg ctataactaat tcattttggt tttegcaacc      420
taattagaga ttgtccagat acaaagagga gtaacctaat aaataaatat taaaatattc      480
accaacggcc tcagtaagct acttgagcta acaatgaga ttccaaata aggtagggtcc      540
ttcccaagtt ctataaatag catccctcac catgtcataa accgcatcac aagttatata      600
ctgtattcat actatacact taccctttca tttta                                     634
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<210> 5

<211> 438

<212> DNA

<213> Medicago sativa

<220>

<223> Nucleotide sequence of H11 regulatory region

<220>

<221> misc_feature

<222> (1)..(438)

<223> where "n" is a or g or c or t or other

<400> 5

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cgcggtggtcg acggcccggg ctggtatcag cgagtaacga ttcacatat ctcacactag      120
ggatgaatga tttattattg agtttatgaa tttgaactat tactttctaat ttctaaatga      180
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agacatttaa gtaaaagatt aaaatattct agtttcaa attttggatt ttagaattta 240
aatttaattct ttaaaaaaaaa attaaattta aagaagataa aaaggagaa aataaataga 300
tgaatataat ttgtaaacat gaagacctta tctccagtaa aaaaacatat ggaccttatt 360
tttttgaggt aggaaggatc tacgcgggga acctcttctt gactgtgaac cccgtatgca 420
gaggcagaga cagagagt 438

<210> 6
<211> 936
<212> DNA
<213> Medicago sativa

<220>

<223> Nucleotide sequence of H12 regulatory region

<400> 6
aaatacaaag gtgaccttat ttgcaaata atccatgcat ggaaatgcat catccttttg 60
aaaatgggtt tatctgaatt cttaagttac gtgaaaattt aatacatttc attttagata 120
aatttattat taaaattcac acttagatgg cctaaaaatt aacacttatt tttacaatt 180
caaataaaat atacgacgaa atgagtgtaa tttagttggt taagcatcgt caaagcttgg 240
agagaaagat catagtttga tctttgaaaa ctatactatt gaaaagggtg aagatatcta 300
acctccaaca aaatttattt gatagtcgat tcaaattatc aaaatttggga aaatattttg 360
taaattgtta agttgggaaa aatatgttaa ttttcaaatt accatttgca cttttttcta 420
atctcaaata acatttaagg gatgttgact actttcgttt tgtacaaata tttacaattt 480
taacatttat aaaatgtggt ttggtagata aaaagtgtga gtattcttta taagagattg 540
tgtttttctt ttgttttaac ttataaaata aatatatatt ttattttatt ttaacgtgag 600
attgtaagaa ttcattataa gattatgtca ttccctcaa agaaaattag atgatgtcat 660
tttcataact ctttttctat aaatacagaa aatcctcaa aatgaaaaac ctgggtcaa 720
aaataaaaga aaaacatcaa tagtggactg gccacactc attgctttgc tttagtatga 780
gaaagtagac ctccaccaacc acgaaccgga cgccgaccgg ttcaacaaaa catcacacca 840
attttcctaa accataccgg tttttccctc ccttatataa ccatacctc cctcttctc 900
taaccaagct tcattcaact cttcaacaca tatcag 936

<210> 7
<211> 1424

<212> DNA

<213> Medicago sativa

<220>

<223> Nucleotide sequence of genomic H7

<400> 7

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acgcgtggtc gacggcccgg gctggtacta aagtattact attaccaaatt ttttaggacc      60
ccacccatga caccattgct atatttcaat ttgggaaaat attgctataa agttactgta      120
gtaactttta gaagaagggt ttttttttaa ggattttaga ggaagggttag caacacacat      180
gcactttaaa tatacatttt ttcttataaa gtttttgtat cgagttgaga aatcatatat      240
atactcataa atcatgtgga tttcatataa tttaatagaa cacataaatt ttaaccgaga      300
aataaagtgt tgcaaatata tgtttaaaga gtacgttggt aacattatit taatttcttt      360
tattcaatcc acactttgag tcatggactg ctatactaatt tcattttgtt tttcgcaacc      420
taattagaga ttgtccagat acaaagagga gtaacctaat aaataaatat taaaatattc      480
accaacggcc tcagtaagct acttgagcta aacaatgaga tttccaaata aggtagggtc      540
ttcccaagtt ctataaatag catccctcac catgtcataa accgcatcac aagttatata      600
ctgtattcat actatacact tacccttca tttacttctt gcatattgat ccttggtatc      660
ttgatataata tatcatgggt gtttttactt tcaatgatga acatgtctca accgtggctc      720
cagctaaact ctacaaggct cttgcaaaag atgctgatga aatcgtecca aaggtgattt      780
ctgctgcccc aagtgttgaa attgttgaa gaaatggagg acccggaact attaagaagc      840
tatccattgt tgaagatggc aaaaccaact ttgtgctaca caaattagat tcagtggatg      900
aggcaaactt tggatataac tacagcttag tgggaggaac aggggttgat gaaagtttag      960
agaaagttga atttgagaca aaaattgttg ctggctctga tgggtggatcc attgttaaga     1020
tttcagtga ataccatacc aaagggtgat caactctatc tgaagcagta cgtgaggaga     1080
ctaaggccaa aggaactgga cttatcaagg ccattgaggg ctacgtttta gcaaacccta     1140
attactagcc aattaaacct tattgaggac ttttaatttg gttgtgttgt ttcatgcgaa     1200
taataattaa agtttatgat gcggttgaag tgtgttgagt atacatcaag gtctttggct     1260
cgtacatgtg tgttggtttt gttggatggt gtgaggtttg agtgctatit tgggtgttta     1320
aaaacaaaaa cctatgttgt gttggtgata aggttttgca ccatctgtat tatgcaataa     1380
ataatgcaaa agaattttat cgcgaaaaaa aaaaaaaaaa aaaa                       1424
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<210> 8
 <211> 1482
 <212> DNA
 <213> Medicago sativa

<220>
 <223> Nucleotide sequence of genomic H11

<220>
 <221> misc_feature
 <222> (1)..(1482)
 <223> Where n is a or g or c or t or other

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 cgcgtaggtcg acggcccggt ctggtatcag cgagtaacga ttcacatat ctcacactag 120
 ggatgaatga tttattattg agtttatgaa tttgaactat tacttctaata ttctaaatga 180
 agacatttaa gtaaaagatt aaaatattct agtttcaaata attttggatt ttagaattta 240
 aatttaattct ttaaaaaaaaa attaaattta aagaagataa aaagggagaa aataaataga 300
 tgaatataat ttgtaaacat gaagacctta tctccagtaa aaaaacatat ggaccttacc 360
 tttttgaggt aggaaggatc tacgcgggga acctcttccg gactgtgaac cccgtatgca 420
 gaggcagaga cagagagtat ggccctccaca ctcagtcttg tcaagcttcc cattctttca 480
 agcatcaaga caccgcaatc aacctcaaaa catgttggtc cacttccatc caaattcaat 540
 attgtccctc ccacccact aaagttttca ttagatcacc aaattaatat caaacaaact 600
 tctcttctat cctccacagc aatcacattt ccattcttat tggataccaa ggcaagcaag 660
 caagcaagca tcctattcta ttctattctt tcatccatat ctttactctt ttgttttcta 720
 accaatccat gatatgaatg ttgttgaaac aggatgcact tgctgttggt ggagagtttg 780
 ggatatttga aggaagaaca ttgctctca ttcaacccat tgtgttgggt ggtttgttct 840
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 aagctatttc caggtccaca tttatttgca ggagcaggca ttaccgtctt atgggcactg 1200

gcagcagctc tagtaccacc gatgcagaaa ggagtgaaa cagccagaaa tcttcacatt 1260
gctctgaata cattgaatgt tcttctcttt gtgtggcaga ttccactgg acttgatatt 1320
gtagtgaaag tgtttgagtt cacaaaatgg ccttgaatgt atgattctca tatgtaagta 1380
agttcccagg tattttactt tcaaatacgt atttggcaat atcaataaat gcaaaaattg 1440
ctattctgca ttttcaaaaa aaaaaaaaaa aaaaaaaaaa aa 1482

<210> 9

<211> 1906

<212> DNA

<213> Medicago sativa

<220>

<223> Nucleotide sequence of genomic H12

<400> 9

aaatacaaag gtgaccttat ttgcaaata atccatgcat ggaaatgcat catccttttg 60
aaaatggggtt tatctgaatt cttaagttac gtgaaaattt aatacatttc attttagata 120
aatttattat taaaattcac acttagatgg cctaaaaatt aacacttatt tttacaatt 180
caaataaaat atacgacgaa atgagtgtaa tttagttggg taagcatcgt caaagcttgg 240
agagaaagat catagtttga tctttgaaaa ctatactatt gaaaagggtg aagatatcta 300
acctccaaca aaatttattt gatagtcgat tcaaattatc aaaatttggg aaatattttg 360
taaattgtta agttgggaaa aatatgttaa ttttcaaatt accatttgca catttttcta 420
atctcaaata acatttaagg gatgttgact actttcggtt tgtacaaata tttacaattt 480
taacatttat aaaatgtggt ttggtagata aaaagtgtga gtattcttta taagagattg 540
tgtttttctt ttgttttaac ttataaaata aatatatatt ttattttatt ttaacgtgag 600
attgtaagaa ttcattataa gattatgtca ttccctcaaa agaaaattag atgatgtcat 660
tttcataact cattttctat aaatacagaa aatcctcaaa aatgaaaaac ctcggtcaaa 720
aaataaaaga aaaacatcaa tagtggactg gccacactc attgctttgc tttagtatga 780
gaaagtagac ctaccaacc acgaaccgga cgccgaccgg ttcaaccaaa catcacacca 840
attttcctaa accataccgg tttttccctc ccttatataa ccatcctctc ccctcttctc 900
taaccaagct tcattcaact cttcaacaca tatcagaaac agaaaaaaga agcaaaacat 960
tccaagaatt taacaatggc aaccaacgaa gatcaaaagc aaactgaatc tggaagacat 1020
caagaagttg gtcacaagag tcttttataa agtgatgctc ttaccagta tattctagag 1080

accagtgtct tcccaagaga acatgaagcc atgaaagagt tgagagaggt cacagcaaaa 1140
 caccatgga acatcatgac aacctctgca gatgaaggac aatttttgag catgctcctt 1200
 aaacttatca atgctaagaa taccatggaa attggtgtct acactggcta ctccctcctt 1260
 gccactgccc tagctattcc tgaagatgga aagattttgg ctatggacat taacaaagaa 1320
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 agagaaggtc cagctcttcc agttcttgat gaaatgatca aagacgaaaa gaatcatggt 1440
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 ttaattgatc ttgttaaagt gggagggtgtg atcggtacg acaacacctt atggaatgga 1560
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 gttttggagc ttaacaaggc tttggctgtg gaccctagga ttgaaatatg tatgcttcct 1680
 gttggtgatg gaatcactat ctgccgtagg atcaagtaat tggtttgcac gtgcactata 1740
 tcatgtaatg cactgctcca cattattgat cattattgtg tggaagctac agagcattta 1800
 aaagtcttca agccttcttg tcttttgta tttttcttca acatatttgt ggttgtaatt 1860
 ttctcttgtc attgatattg aaacttcgaa taattgaaag ttatat 1906

<210> 10

<211> 157

<212> PRT

<213> Medicago sativa

<220>

<223> Amino acid sequence encoded by H7 coding region

<400> 10

Met Gly Val Phe Thr Phe Asn Asp Glu His Val Ser Thr Val Ala Pro
 1 5 10 15

Ala Lys Leu Tyr Lys Ala Leu Ala Lys Asp Ala Asp Glu Ile Val Pro
 20 25 30

Lys Val Ile Ser Ala Ala Gln Ser Val Glu Ile Val Glu Gly Asn Gly
 35 40 45

Gly Pro Gly Thr Ile Lys Lys Leu Ser Ile Val Glu Asp Gly Lys Thr
 50 55 60

Asn Phe Val Leu His Lys Leu Asp Ser Val Asp Glu Ala Asn Phe Gly
 65 70 75 80

Tyr Asn Tyr Ser Leu Val Gly Gly Thr Gly Leu Asp Glu Ser Leu Glu
 85 90 95

Lys Val Glu Phe Glu Thr Lys Ile Val Ala Gly Ser Asp Gly Gly Ser
 100 105 110

Ile Val Lys Ile Ser Val Lys Tyr His Thr Lys Gly Asp Ala Thr Leu
 115 120 125

Ser Glu Ala Val Arg Glu Glu Thr Lys Ala Lys Gly Thr Gly Leu Ile
 130 135 140

Lys Ala Ile Glu Gly Tyr Val Leu Ala Asn Pro Asn Tyr
 145 150 155

<210> 11

<211> 247

<212> PRT

<213> Medicago sativa

<220>

<223> Amino acid sequence encoded by H12 coding region

<400> 11

Met Ala Thr Asn Glu Asp Gln Lys Gln Thr Glu Ser Gly Arg His Gln
 1 5 10 15

Glu Val Gly His Lys Ser Leu Leu Gln Ser Asp Ala Leu Tyr Gln Tyr
 20 25 30

Ile Leu Glu Thr Ser Val Phe Pro Arg Glu His Glu Ala Met Lys Glu
 35 40 45

Leu Arg Glu Val Thr Ala Lys His Pro Trp Asn Ile Met Thr Thr Ser
 50 55 60

Ala Asp Glu Gly Gln Phe Leu Ser Met Leu Leu Lys Leu Ile Asn Ala
 65 70 75 80

Lys Asn Thr Met Glu Ile Gly Val Tyr Thr Gly Tyr Ser Leu Leu Ala
85 90 95

Thr Ala Leu Ala Ile Pro Glu Asp Gly Lys Ile Leu Ala Met Asp Ile
100 105 110

Asn Lys Glu Asn Tyr Glu Leu Gly Leu Pro Val Ile Lys Lys Ala Gly
115 120 125

Val Asp His Lys Ile Asp Phe Arg Glu Gly Pro Ala Leu Pro Val Leu
130 135 140

Asp Glu Met Ile Lys Asp Glu Lys Asn His Gly Ser Tyr Asp Phe Ile
145 150 155 160

Phe Val Asp Ala Asp Lys Asp Asn Tyr Leu Asn Tyr His Lys Arg Leu
165 170 175

Ile Asp Leu Val Lys Val Gly Gly Val Ile Gly Tyr Asp Asn Thr Leu
180 185 190

Trp Asn Gly Ser Val Val Ala Pro Pro Asp Ala Pro Leu Arg Lys Tyr
195 200 205

Val Arg Tyr Tyr Arg Asp Phe Val Leu Glu Leu Asn Lys Ala Leu Ala
210 215 220

Val Asp Pro Arg Ile Glu Ile Cys Met Leu Pro Val Gly Asp Gly Ile
225 230 235 240

Thr Ile Cys Arg Arg Ile Lys
245

<210> 12

<211> 44

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of PCR-Select cDNA synthesis primer; see Fig.2

<220>

<221> misc_feature

<222> (1)..(44)

<223> where n is a or g or c or t or other

<400> 12

ttttgtacaa gctttttttt tttttttttt tttttttttt tttn

44

<210> 13

<211> 44

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of Adaptor 1; see Fig.2

<400> 13

ctaatacgac tcactatagg gctcgagcgg ccgcccgggc aggt

44

<210> 14

<211> 42

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of Adaptor 2R; see Fig.2

<400> 14

ctaatacgac tcactatagg gcagcgtggt cgcggccgag gt

42

<210> 15

<211> 22

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of PCR primer 1; see Fig.2

<400> 15

ctaatacgac tcactatagg gc

22

<210> 16

<211> 19

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of nested PCR primer 1; see Fig.2

<400> 16

tcgagcggcc gcccgggca

19

<210> 17
<211> 20
<212> DNA
<213> Artificial Sequence

<220>

<223> Nucleotide sequence of nested PCR primer 2R; see Fig.2

<400> 17

agcgtggtcg cggccgaggt

20

<210> 18

<211> 10

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of complement (partial); see Fig.2

<400> 18

ggcccgtcca

10

<210> 19

<211> 10

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of complement (partial); see Fig.2

<400> 19

gccggctcca

10